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ABSTRACT

Between 1987 and 1990, the work force of the Mare Island Naval Shipyard (Vallejo, California) was reduced from 10,000 to 7,200 employees. The management strategy for moving through this period included the following: (1) using a flexible work force; (2) using Computer-Assisted Manpower Analyses System (CAMAS) flow models to ensure that management had considered long-term impacts of accelerating attrition; (3) using apprentice programs as a training pipeline; (4) implementing a comprehensive outplacement program; and (5) maintaining a computerized skills bank of data on exiting employees. A strong communication program was initiated from the outset to show concern and ease tension. Outplacement staff conducted career workshops and job fairs. One successful strategy in the downsizing was a variety of efforts to accelerate attrition. The decision support system was used throughout the downsizing to develop the strategic and tactical plans and to monitor and control the stream of decisions as the work force changes unfolded. The 1990 downsizing plan and results were analyzed to identify efforts that worked well and problems encountered, such as lack of time, misassignments, and poor communication. Improvements for a 1991 reduction in force (RIF) were planned. A recovery and revitalization program was designed to minimize impacts after the RIF and maintain and increase productivity. (Appendixes include 12 references and an analysis of Microcomputer CAMAS modeling application and implementation issues.) (YLB)

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RESEARCH REPORT NO. 52

MANAGEMENT OF A MAJOR DOWNSIZING AT A NAVAL SHIPYARD

BY M. AGUILAR
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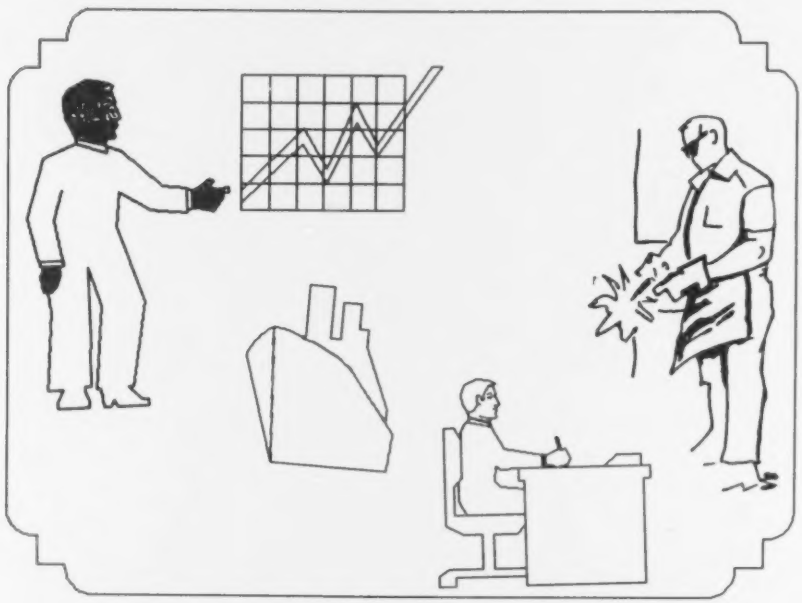

DEPARTMENT OF THE NAVY

OFFICE OF CHIEF OF NAVAL OPERATIONS (OP-160)

WASHINGTON, D.C. 20350

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MANAGEMENT OF A MAJOR DOWNSIZING AT A NAVAL SHIPYARD

by

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June 1991

This report was prepared for presentation at the Human Resource Planning Society Research Symposium, Salve Regina University, Newport, Rhode Island, 11-14 June, 1991. The appendix to this report is an extract from "A Best Fit Planning Model for Managing Personnel Turbulence" by M. Aguilar, E.S. Bres, R.J. Niehaus, and F.S. Sharkey published in Niehaus, R.J., Ed., Human Resource Strategies for Organizations in Transition (New York: Plenum Press, 1990).

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This report provides an operational case study of the strategic and tactical actions which were taken before, during and after the 1990 drawdown at Mare Island Naval Shipyard. The appendix provides a description of the Micro Computer-Assisted Manpower Analyses System (MCAMAS) which was used to provide the decision support tools used to guide the management actions.

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FOREWORD

Research Report No. 52 was prepared as part of the civilian planning modeling activities of the Program Management Branch (OP-160) of the Manpower, Personnel and Training (MPT) Information Resource Management Division. This report provides a description of an operational case study of the strategic and tactical actions which were taken before, during, and after the major drawdown in 1990 at Mare Island Naval Shipyard in Vallejo, California. An appendix is provided describing in more detail the Micro Computer-Assisted Manpower Information System (MCAMAS) used as the decision support tool to assist in the overall management actions.

RICHARD J. NIEHAUS
Head, Program Management
Branch (OP-160)

INTRODUCTION

During the 1988-1990 period, Mare Island Naval Shipyard experienced a large overall workload reduction with intermediate periods of minor growth consistent with ship overhaul schedules. Between 1987 and 1990, the workforce was reduced from 10,000 to 7,200 employees. A wide variety of personnel programs were used to facilitate the workload changes while providing a way for shipyard employees to maintain an orderly life, where possible. This paper provides an operational case study of the strategic and tactical actions which were taken before, during, and after the drawdown at the shipyard.

An integrated approach is shown which relates the management process with the information support system. Emphasis is on the management decisions necessary for direction and continuity to ensure a productive organization throughout the process. The decision support and modeling system was used to develop the strategic and tactical plans and to monitor and control the stream of decisions as the workforce changes unfolded. Innovative management practices were instituted to integrate necessary decisions with employee needs at each stage of development.

In addition to the quantitative issues brought out by the decision support system, considerable effort was made to include all segments and interest groups at risk during the downsizing. This paper discusses the integration of those capabilities with a variety of management practices. These include such issues as: involvement of the unions, use of job clubs, use of multi-media including videos, newsletters and the press, etc. The extensive use of the multi-media ensured that

the whole shipyard community was fully informed and involved, where possible, in this turbulent process. Equal employment opportunity (EEO) and impact on women issues were also addressed, adding to the complexity of making the necessary transitions. The paper concludes with an examination of the need to continue the analysis and use of innovative approaches during the early post drawdown period.

BACKGROUND AND SITUATION

Massive changes in the defense posture of the United States are underway. For a naval shipyard charged with the maintenance of nuclear submarines, the issue became how to most gracefully implement a large workload reduction while minimizing the impact on the shipyard's effectiveness and on employee livelihoods. The goal has been and continues to be to retain an adequate, skilled, core workforce during the downturn in a way that will allow the continuation of a competitive workforce. In the longer term, the workload will fluctuate about a lower level average personnel strength.

A previous paper (see Aguilar, Bres, Niehaus, and Sharkey, 1990) described the Mare Island Naval Shipyard efforts to use all available tools and approaches for managing expected personnel turbulence. The idea is that any important decision should use all available information and be as forthright as possible with both management and employees. Overall management concerns remain:

- Keeping the workforce lean to successfully compete for work.
- Planning for workforce strengths to reduce personnel impacts.
- Maintaining a highly skilled workforce.
- Planning for resource availability to meet the projected workload in the mid 1990's.

The shipyard has participated in developing and implementing many workforce planning models to manage its workforce more effectively. This work is the result of a long-term Navy program in developing civilian workforce planning methodologies and supporting information systems (see Charnes, Cooper, and Niehaus (1972) and Niehaus (1979, 1988)). These models are part of the Computer-Assisted Manpower Analyses System (CAMAS), a Navy-wide information system to provide assistance for a variety of civilian personnel planning applications.

In the study just before the dramatic events in Eastern Europe, the shipyard faced a 30% workload drop for FY90-91, expecting a return to previous workload levels in FY95-98. However, because of the deactivation of several submarines, the workload is now expected to continue to decline at reduced levels with small peaks and valleys over time. These changes illustrate the dynamic nature of workload and related workforce planning with the need to continue responding to significant unexpected changes. Essentially, the need is to have a management response capability which allows the rapid evaluation of unforeseen perturbations in the workload.

Figure 1 shows the changes in workload and staff over the past several years. The accessions (hiring) and loss patterns are also shown. There have been a series of reductions over the past three years. The most traumatic was the Reduction-In-Force (RIF) of 460 personnel, implemented in September 1990. This overall tracking of workforce changes was quite helpful in formulating the strategic alternatives which were modeled using a decision support system. Originally, a much larger reduction was

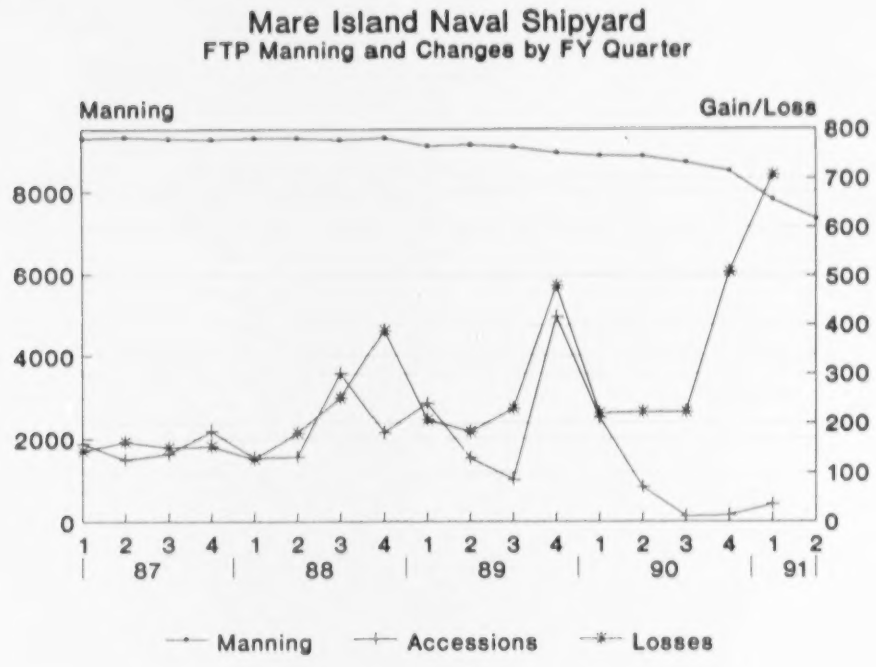

Figure 1: Mare Island Full Time Permanent Manning and Changes

expected. Through much planning and subsequent management action by both the shipyard and higher level authorities, the difficult RIF actions were brought to a minimum.

Figure 2 shows several alternatives, using the different scenarios, under consideration during management discussions before the 1990 RIF action. This particular chart was developed just before the RIF. Its purpose was to focus on the workforce strategy of concern over the next few years of reduced workload. More descriptive information concerning the different models can be found in Aguilar, et. al. (1990). Technical discussions of the underlying model structure can be found in Niehaus (1979).

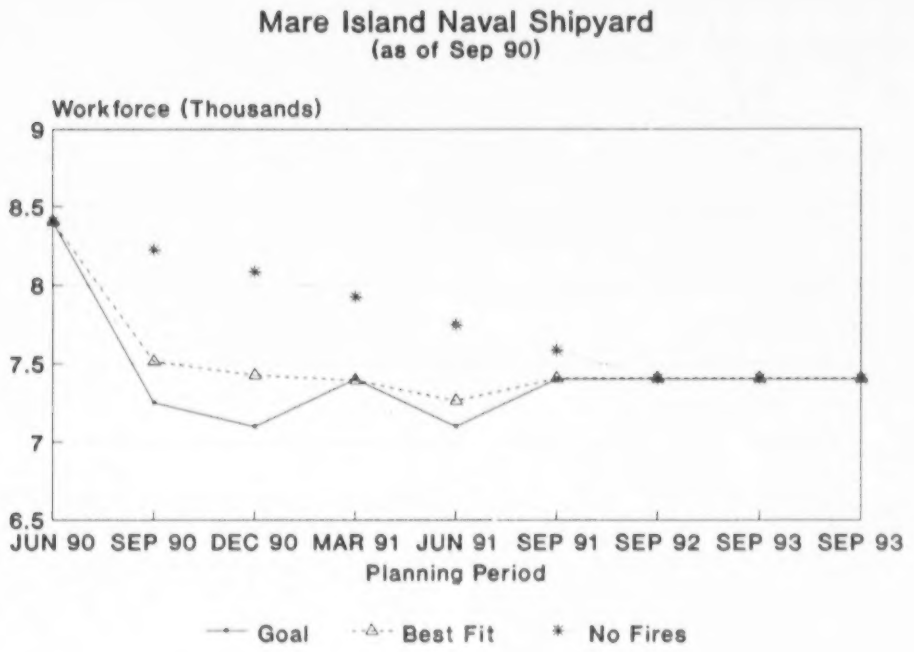

Figure 2: Mare Island Goals and Projected Workforce

The three types of scenarios which have been incorporated into the supporting Micro CAMAS (MCAMAS) support system are: (1) no hires, (2) force fit, and (3) best fit views of the future. The "no hires" case assumes there will be no replacement of losses from the outside with normal personnel flows permitted to continue within the organization. The "force fit" case assumes that workload requirements will be balanced precisely at each time period with adjustments accommodated through external additions or deletions to the workforce. Normal internal personnel flows are permitted to continue. The "best fit" case assumes the balancing of the workforce within each period as well as over time. This permits some management flexibility both in the

internal movements and external additions or deletions to the workforce.

Many model alternatives were run over the course of the Mare Island downsizing to help guide the shipyard from a personnel strength of over 9800 to 7200 at the conclusion of the 1990 RIF action. During the six months before the 1990 RIF, the model was run frequently as changes were proposed or made to the workload and on-board personnel. The no-hires and force fit results were used to obtain a quick read-out of proposed changes. The best fit results allowed shipyard management to smooth the workforce transitions by adjusting the peaks and valleys of the workload or personnel strengths as appropriate.

The next sections discuss the management and outplacement strategies and actions before and during a RIF, implemented in September 1990. This is followed by a summary of the decision support system which was discussed in the previous study. The The final section examines the post drawdown actions and future directions to institutionalize the successful approaches used in a crisis.

MANAGEMENT STRATEGY

The management strategy for moving through this difficult period included:

- Using a flexible workforce.
- Using CAMAS flow models for projecting management actions to ensure management has considered long-term impacts of accelerating attrition.
- Using apprentice programs as a training pipeline.
- Implementing a comprehensive outplacement program.
- Maintaining a computerized skills bank of data on exiting employees interested in returning to the shipyard for future work.

The shipyard has been modifying its employment practices for several years. Before the RIF action, 10% percent of the workforce was comprised of temporary and on-call employees. Twenty-five percent of the force was eligible for retirement (optional and early out). With this flexible group of temporaries, on-calls, and potential retirees, the shipyard was able to downsize with much smaller forced RIFs of the skilled core workforce.

As a continuing strategy, the apprentice program was maintained to provide a pipeline for producing skilled people needed in the mid 1990s as well as placement for some of the affected employees. Particular attention was placed on the placement of women and minority employees into the apprentice program to help minimize the impact on EEO posture of the shipyard. Care was taken since excessive use of the apprentice program would have had too much of a short term impact on the shipyard's productivity ratios.

Dramatically increasing the size of the apprentice class to accommodate a large number of excess helpers and limited mechanics and projected needs in 1995 would cause overspending during downsizing and an over-supply of expensive employees in the longer term. Training mechanics for four years in an apprentice program makes sense only if you intend to get a return on your investment by retaining them. This logic was very important in planning for the downsizing.

Since the shipyard's resources come from a revolving fund, employment is directly driven by the workload (the number of ships assigned for overhaul or repair). Some increase in near-term (FY90-94) workloads could allow related increases in the

apprentice classes to meet the workload increase in FY95 without making the shipyard's overhead cost too high. The increased apprentice classes would also allow the retention of more limited mechanics through FY90-94.

Optional early retirement was also offered at earlier stages of the downsizing to retain the recently trained workforce for the future. Early retirement allows those at least 50 years old with 20 years service, or at any age with 25 years service to retire.

The shipyard's outplacement program merits special discussion. The next section provides an in-depth review of the outplacement program, instituted at Mare Island.

OUTPLACEMENT/DOWNSIZING PROGRAM

One underlying assumption during downsizing is that assistance in career transition will leave positive feelings in all employees. The residual workforce will have less guilt and fear and the outplaced will have a more positive attitude toward a responsible employer. Downsizing raises many critical human resource issues deserving serious attention from top management. The shipyard's approach to the downsizing issue will impact its current and future performance and productivity.

At the beginning of the 1989/90 downsizing, the Personnel Operations Division met with senior management to inform them of the necessary actions for a least disruptive course of action. The decision support system, along with downsizing planning forms, were used to determine excess positions. The downsizing options discussed for trimming the workforce included: terminating temporaries, releasing on-calls, offering retirements where possible, using leave without pay and full-time to part-time actions, and

implementing a comprehensive outplacement assistance program.

A strong communication program was initiated from the outset. It is in the organization's best interest to show the highest level of concern and ethics when downsizing. Effective communication is a critical step in showing concern and easing tension. As rumors spread, it is important that employees remain informed of current conditions. All available forms of communication media were used to maximum advantage.

The communications program focused on both in-house and public channels. The in-house Mare Island bi-weekly news publication Grapevine featured articles on RIF and outplacement issues. For example, one issue provided an an entire pull-out section on downsizing. The public affairs office kept the local newspapers and TV stations informed of details which could be disseminated to a wider audience.

Monthly newsletters were sent to each employee's home address informing them of all the options available to them should they be affected. Several videotapes on the status of the downsizing were made for internal viewing. The personnel staff sponsored lunch time information sessions on a biweekly basis to keep all interested parties informed. This early and frequent use of all available communications media was one of the cornerstones of the success of the downsizing program. Shipyard management felt it was extremely important to employee morale to keep rumors to a minimum.

Supervisors were fully informed of every aspect of the RIF by videotapes, staff meetings, and handouts. A particularly useful videotape presented scenarios showing the right and

wrong way to hand out RIF notices. The face-to-face and videos were supplemented by handouts such as one on common feelings experienced by employees who lose their jobs.

In an effort to allow employees a means of gaining and sharing job search information, "job clubs" were formed in organizations or occupation areas where extensive downsizing would occur. Each job club consisted of a leader (selected by the department and trained by the outplacement staff) and a small group of employees (10-20). In those shops/organizations with large numbers targeted for downsizing, as many as 15 to 20 job clubs were formed. Each shop/organization then assigned a Job Club Coordinator who coordinated all activities with the various job club leaders in their area. Figure 3 summarizes the responsibilities of the various staff and members of the job clubs.

The Outplacement staff conducted informative and useful career workshops to assist targeted employees with their job search. The attendees recognized that the labor market has changed considerably during the past five to ten years. They gained insight into the current approach to seeking a job. Among the workshops sponsored were:

- Resume Preparation.
- Federal Personal Qualifications Statement (SF-171) Application Completion.
- Interview Techniques.
- Hidden Job Market.
- Stress Management.
- Starting Your Own Business.
- Financial Management.

Monthly "job fairs" were conducted on site where employees met with a wide variety of employers. Other Federal activities, local, state, national, public as well as private sector

OUTPLACEMENT STAFF

- Train Job Club Leaders.
- Provide Workshops to members.
- Sponsor Job Fairs and Employer Interviews.
- Facilitate weekly Job Club Leader Meetings.

JOB CLUB COORDINATORS

- Receive information from Outplacement Staff.
- Disseminate information to Job Club Leaders.
- Serve as liaison between Outplacement Staff and Department Management.
- Attend weekly Job Club Leader meetings.
- Receive and disseminate weekly job vacancy packets.

JOB CLUB LEADERS

- Attend Job Club Leader training.
- Lead groups of 10-20 employees.
- Meet with Job Club weekly/biweekly.
- Coordinate workshop attendance of members.
- Provide positive reinforcement and encouragement.
- Attend Job Club Leader meetings weekly.

JOB CLUB MEMBERS

(LIMITED TO 20 HOURS)

- Meet with leaders weekly/biweekly.
- Attend Job Search Workshops.
- Prepare Resume and SF-171.
- Review job vacancy information.

(LIMITED TO 12 HOURS)

- Attend Job Fairs and Interviews.
- Make employer contacts.

Figure 3: Job Club Responsibilities

employers were represented. A total of six job fairs were held where 154 organizations shared occupational information with 3,128 employees. Figure 4 provides the types of issues that need to be addressed in coordinating job fairs.

One of the successful strategies in the downsizing was a variety of efforts to accelerate attrition. The decision support system was used to estimate the effects of controlling personnel movements within the shipyard to channel employees to

- o Identify occupations of employees who will attend the job fair.
- o Determine the job fair date.
- o Locate a facility.
- o Invite appropriate employers.
- o Confirm employers participating (two weeks prior to the job fair).
- o Send employers a reminder and entry instructions.
- o Develop information for job fair attendees.
  - handout of employers attending.
  - map of the facility and the organizational layout.
  - evaluation forms.
- o Prepare facilities for the job fair.
- o Conduct the job fair.
- o Evaluate employee/employer assessment of the job fair.

Figure 4: Job Fair Coordination Issues

available opportunities both within and external to the shipyard. The shipyard was aided by a robust external labor market in the San Francisco Bay Area. Table 1 shows the results of various efforts to accelerate attrition. All the different efforts accelerated attrition and eased the impact of separations due to RIF. In the end, 460 employees were terminated through RIF action.

Once employees received RIF notices, a more concentrated effort was focused on those employees who would be separated

TABLE 1
ACCELERATED ATTRITION

ACTION	NUMBER OF EMPLOYEES	
Termination of Temporaries		213
On-call Employees Put in Non-pay Status		267
Retirement Options		
Early Retirement	125	
Optional & Discontinued Service Retirement	146	
Total Retirement		271
Job Club Outplacement Efforts		
Offers Made	434	
Offers Accepted		350
TOTAL ACCELERATED ATTRITION		1,101

JOB CLUB HOURS

- Approved additional 10 hours per week for job search activities.

INDIVIDUAL CAREER COUNSELING

- Half hour sessions for separated employees.
- Self Directed Search was administered for skills assessment.

EMPLOYER INTERVIEWS

- Due to time constraints in the final month, efforts were directed to bringing in employers to do individual interviews rather than having another job fair.
- Public, Private, and Government Sector Employers were brought in to interview employees.

CASE MANAGEMENT

- Develop short term career plan.
- Format and print copies of resumes.
- Maintain case file.
- Serve as liaison between employee and potential employer.

OUTSIDE AGENCY REFERRALS

- Local Private Industry Councils.
- State Employment Development Department.
- Mare Island Federal Credit Union.
- Small Business Development Center.

Figure 5: Post RIF Outplacement Activities

from the shipyard. Figure 5 indicates the types of services offered to individuals to assist with career planning issues.

Throughout the shipyard downsizing, the outplacement staff evaluated the success of program activity. Assessment continues in an effort to gain an accurate view of the impact of RIF and outplacement activities. Figure 6 provides a list of surveys used in assessing program activities. Separated employees are continuing to be tracked to ascertain their status in their post-RIF situation.

OUTPLACEMENT INTEREST FORM

- Given to management to indicate outplacement interest.
- Offered employees such options as LWOP, early retirement, change to part time, participation in job clubs.

JOB CLUB LEADER WEEKLY REPORT

- Leaders indicate meeting times, items discussed, offers made to members and problems/concerns to be addressed by Outplacement Staff.

OFFER/RESIGNATION FORM

- Job Club members return form to Outplacement Staff when they have been offered and have accepted a position.

JOB FAIR EVALUATION FORM

- Employees attending job fairs evaluated employers attending, handouts available, time allowed and overall impression.

JOB CLUB MEMBER SURVEY

- Job club members were surveyed to determine how job club activities were going, if they found their leaders workshops and job fairs effective, and any suggestions for Outplacement Staff.

OUTPLACEMENT SURVEY

- Employees received survey with their notification of separation.
- Employees were asked what companies and positions they were interested in, what obstacles they faced, and what assistance Outplacement could provide.

PRIORITY OUTPLACEMENT QUESTIONNAIRE

- After issuance of RIF notices, affected employees were asked if they had participated in job clubs and if they were interested in counseling sessions and job fairs.

COUNSELOR ASSESSMENT FORM

- Employees who participated in career counseling sessions were asked for short range plans, outplacement activities they attended, and any special considerations.

SEPARATION SURVEY - JOB CLUB LEADERS

- Job club leaders were asked to update the status of separatees, (i.e., whether they had participated in outplacement, if they had received another Federal or private industry job, and if their notice had been rescinded).

Figure 6: Outplacement Program Assessment Surveys

Attention is paid to the impact of the RIF on the workforce profiles by race or national origin and sex. In many cases, the civil service rules governing a RIF took precedence over EEO regulations. Where possible, positive efforts continue to be made to be an equal opportunity employer within the confines of the stronger retention regulations.

As mentioned earlier, the decision support system was used throughout the downsizing. The next section describes this system in more detail.

DECISION SUPPORT SYSTEM

The decision support system, developed at Mare Island, is aimed at integrating workload and workforce planning. This system has both "top down" and "bottom up" components. The purpose is to provide rapid evaluation of short and long term workload and workforce quality/quantity issues. Skills balancing strategies are developed at both the individual shop and cross-organizational levels. Particular attention is placed on identifying and tracking the core workforce.

The organization has established a common planning methodology. The key driver is the workload available to the shipyard. The Navy fleet maintenance, overhaul and nuclear refueling schedule is determined centrally to account for fleet operations, required maintenance cycles, and new ship additions. Periodically, there is a workload conference; participation includes all the naval shipyards to assure local input to shipyard workload balancing issues. These decisions are aided by long range workforce planning models using the microcomputer version of the MCAMAS.

The workload analysis part decision support system produces two types of reports. There is the workload forecasting model producing one to seven year studies by shop. These outputs are complimented by one to three year workload profiles by trade skill.

The heart of the shorter range or one to three/four year workforce planning is total shipyard analysis using the types of MCAMAS model outputs briefly described at the beginning of this paper. Analyses are produced comparing "no hiring", "force-fit to goals" and "best-fit to goals". The system involves an eight period model which uses quarters to the end of the first full fiscal year and years thereafter. The shipyard-wide reports are extended to the shop level by deterministic models producing monthly workforce plans and trade level manning plans.

At the execution level, the shop level models can be used to produce proposed RIFs monthly before the RIF date based on the current workload and on-board count. These RIF data can also be calculated by trade skill.

Because of the the need for MCAMAS results during the RIF, only part of the screen-driven user interfaces were complete. System operation required some intervention by a trained analyst for operation. While not difficult, the user needed to know several microcomputer packages such as LOTUS 1-2-3, LINDO, and Harvard Graphics following a fairly easy run sequence. This would initiate some executable computer programs to bridge between the packages. More recently, the screen-driven version of MCAMAS has been completed. In this version, MCAMAS has a user oriented front end for the entire run sequence. This shell software allows running of the models from initial data

file preparation to final report graphics in a manner similar to most microcomputer packages. This version of MCAMAS is being exported to the other naval shipyards and eventually to the larger field installations of the Department of the Navy.

LESSONS LEARNED

The 1990 downsizing plan and results were analyzed by representatives from shipyard management, unions, and employees. Lessons learned were identified and process improvement teams were established to develop new downsizing strategies for further reductions which are on the horizon in 1991. The downsizing efforts that worked well in 1990 are summarized in Figure 7.

OUTPLACEMENT

- Job clubs
- Workshops and counseling
- Job fairs
- Communications
  - Newsletters
  - Videos
  - Lunchtime sessions

REDUCTION-IN-FORCE (RIF)

- Communications
- Counseling
- Training for managers on how to issue a RIF notice
- Weekly meetings with unions
- RIF point-of-contact for questions
- Early-out retirement
- Severance pay calculations on notice
- Issuing two notices (one in person and one by mail)
- Department of Defense Priority Placement Program

SHIPYARD MANAGEMENT

- No impact on production schedule
- Teamwork throughout
- Smooth check-out procedure for affected personnel

Figure 7: Efforts that Worked Well in 1990 Downsizing

OUTPLACEMENT

- o Not enough time
- o Hard to stop attrition in technical areas

REDUCTION-IN-FORCE (RIF)

- o Vacancies left unfilled
- o Mis-assignments
- o Amendments created other problems
- o Performance appraisals
- o Impact on women and minorities
- o Communications (Employees expected managers to know their fate)
- o Official Personnel Files (OPFs)
  - Confusion of RIF process (bump and retreat)
  - Confusion about 30-day extensions
- o Compensation
  - Severance pay with amendments
  - Numbers receiving severance
- o Notice of Personnel Action (SF-50)
  - Not ready soon enough
  - Problems on the last day

SHIPYARD MANAGEMENT

- o Managers needed earlier notification of results
- o Employees being downgraded but performing same work
- o Better coordination needed on placements
- o Federal Employees Compensation Act (FECA) problems (workman's compensation for light duty employees)

Figure 8: Problems Identified during 1990 Downsizing

As might be expected, everything did not turn out as planned. Figure 8 shows some to the problems identified or efforts that didn't work during the 1990 downsizing.

MAJOR IMPROVEMENTS PLANNED IN PROCESS

After the 1990 RIF was concluded it was learned that additional personnel reductions may be necessary as the planned workload was reduced even further. The 1991 RIF will be analyzed and coordinated largely though the use of computer-

assisted support. This approach will shorten the length of process time. Additionally, it will allow enough time to conduct a simulated or "mock" RIF to give employees an earlier indication as to who will be affected.

Employees indicated for separation, reassignment or downgrade will be given at least sixty days notice. The notice period in 1990 was too short. It was difficult for the RIF team to complete RIF counseling within thirty days. At the same time the team had problems dealing with numerous changes and amendments required before the effective date of the RIF. Employees need to be given more time after an official notice to be able to decide about: shifting into private industry, accepting offers from the DOD Priority Placement Program (stopper list), or retiring. The minimum notice period should be sixty days.

The analysis of the impact of the RIF on minority and women will be a continuous process throughout the 1991 downsizing. There will be three different points in the RIF process for impact review: (1) after the first round of competition of the mock RIF, (2) after the completion of the mock RIF, and (3) after completion of the actual RIF analysis (before issuance of notices).

Outplacement will start after the conduct of the mock RIF. Employees proposed for separation from the mock RIF will be eligible for job clubs and other outplacement assistance. This will include voluntary early registration in the DOD Priority Placement Program.

The shipyard is committed to fostering teamwork at <u>all</u> levels. Continuing efforts are being made to keep all employees informed of the status of the RIF and associated outplacement

assistance. Comprehensive communication efforts are being done using the following media: video presentations, newsletters, Shipyard newspaper pull-out sections, KMNS (530 AM) radio station, electronic marquees, weekly meetings with union/management/ rightsizing points of contact, and lunchtime information sessions.

The outplacement staff of the personnel office has been moved to the waterfront production shop area. Due to current economic conditions and recent increases in unemployment in the San Francisco bay area, the focus of outplacement has changed. Small group sessions are being conducted to provide hands-on assistance with: resumes and Federal employment application (SF-171) preparation, interview preparation and role playing, and telephone scripting. An employee job information center has been set up. A wide variety of job search material is provided to job club members for viewing and copying.

A career fair will be held prior to the issuance of mock RIF notices open to all shipyard employees. The purpose is to allow employees to gather information about future educational and career opportunities. A wide variety of organizations and educational institutions will be in attendance. A job fair is planned after the mock RIF notices are issued open to those identified for separation.

To deal with the concerns and issues of recovery and revitalization after the RIF action, a two-phase approach is being developed. The next section provides a program description.

RECOVERY AND REVITALIZATION

A recovery and revitalization program has been designed to minimize impacts after the RIF and maintain and increase the shipyard's productivity ratio. The recovery phase is being designed to minimize the negative impact of downsizing on remaining employees. The revitalization phase will be a continuing program to rebuild employee commitment to the shipyard's mission and future. The revitalization phase is being delayed due to the impending 1991 reductions.

The recovery phase is being designed as an educational program on the environmental, economic, and social factors creating the need for change. Particular attention will be placed on reducing anxiety due to downsizing and on providing employees with an awareness of their value and contribution to the shipyard's mission and future. The shipyard's vision will continued to be shared through the total quality management (TQM) program and the shipyard's strategic plan. Workshops are to be developed for management and non-exempt employees. Management workshops will be held before employee workshops. Figure 9 provides the issues to be covered in the workshops.

The revitalization phase stresses the development of pathways for open dialogue between management and employees. Individual managers focus attention on the shipyard's vision of the future through identification of specific goals for their segment of the organization. Programs are being developed to increase workforce skills through cross-training, retraining, and job rotation. Effective human resource management is stressed with a focus on integrating business needs with employee needs.

MANAGEMENT WORKSHOPS

- o Gaining management understanding and support for the recovery effort.
- o Exploring new communication efforts with their employees.
- o Understanding and coping with change.
- o Supporting Total Quality Management (TQM).

EMPLOYEE WORKSHOPS

- o Understanding change and the factors creating the need for change.
- o Managing Change.
- o Reducing anxiety to due downsizing.
  - job burnout.
  - stress.
  - survivor guilt.
  - performance anxiety.
- o Presenting the Shipyard's mission.
- o Creating a vision of the future and generating a recognition that everyone has a stake in and shares responsibility in making that vision a reality.

Figure 9: Issues in Workshops Recovery Phase

The encouragement of career development is being done with emphasis on job satisfaction rather than promotion potential. A mentoring program has been established for employees in professional occupations. Employee participation has been formally incorporated in the process as organizations are being restructured to fit the smaller size of the shipyard.

CONCLUSION

This report provides an operational example of the many considerations which can be used to try to make the best of a downsizing situation. Using decision and information support systems throughout the process is critical to provide early warnings and quick assessments along the way. Extensive communication early and often is extremely important. Positive

employee oriented programs must be implemented at critical points as the downsizing proceeds. Equally important is the casting of all these programs with a view to the future. This will maintain a productive workforce to fulfill the organization's short and long term missions.

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APPENDIX A

MICROCOMPUTER COMPUTER-ASSISTED MANPOWER ANALYSES SYSTEM (MCAMAS) MODELING APPLICATION AND IMPLEMENTATION ISSUES *

MODELING ISSUES

The personnel flow models originally developed as part of the Computer-Assisted Manpower Analyses System (CAMAS) have been extended and converted for use on a microcomputer. The initial applications and uses were described by Bres, Niehaus, Sharkey, and Weber (1987, 1988). Two types of models are being used:

a. Forced-fit models using simple personnel flow models to obtain rapid first cut results.

b. Optimization models to obtain a best fit of the work-force to the workload over time, including management controlled, flexible personnel flows. A more extensive management-oriented review of these modeling approaches can be found in Niehaus (1988).

The rates of movement (transition rates) between personnel categories defined by occupation and responsibility level are fundamental features of these models. The transition rates are used to project the movement of the current workforce and future hires for each of the periods used in the model. The time periods can be a combination of quarters and years to provide an integrated short and longer term perspective in the analysis.

In the original microcomputer versions,these data are estimated from historical data available through CAMAS, which operates on a mainframe computer. In the more recent Micro-CAMAS (MCAMAS) the transition rates can be developed directly on a microcomputer from downloads of the basic files from the Navy Civilian Personnel Data System (NCPDS).

Except for transition rates, all model results in the examples which follow were obtained by microcomputer with a substantial amount of the work performed at the test site, Mare Island Naval Shipyard. The prior studies concerned total workforce sizing, occupational staffing, and skill level balances. This study concerns all of these issues in the framework of the dynamic problem of planning for a steep workload downturn, followed by a substantial projected upturn. (As reported in the main body of this paper, the issue has been revised to account for a large drawdown with stabilization at a much lower personnel strength level in the future.)

* This appendix is an extract from Aguliar, Bres, Niehaus and Sharkey (1990)

The issue addressed by the models is to simultaneously meet management targets as closely as possible, while allowing consideration of planning alternatives would be better for shipyard and Navy missions. The optimization models have been engineered to look at several versions of the underlying situation. A brief review of the models used to develop this study is discussed below.

Force Fit Model

The initial or "force fit model" uses specific staffing goals for each occupation and level in each planning period. Hires and fires are determined after projecting the prior workforce using historical transition rates and comparing the remaining workforce to the targets. The hire and fire numbers are totaled separately. The goals reflect anticipated workload over the planning periods. This is called a force fit model since workforce targets must be exactly met. The model's value is that it can rapidly obtain solutions useful to management using microcomputer spreadsheet software such as LOTUS 1-2-3.

Best Fit Model

In many situations, there are strong management or external constraints (e.g., the ability to hire required skilled employees) that will affect the outcome. These constraints may make it impossible or at least inadvisable to meet the detailed staffing goals precisely in each planning period. The best one can hope for is to meet the goal as closely as possible. One way to represent and evaluate these situations is to use "goal programming" human resource planning models. These models combine projected personnel flows and staffing goals for each category along with management and external constraints. Solutions of these models give recommended hires, fires, and staffing targets to come as close as possible to specified requirements over the entire planning horizon, given the identified constraints.

These goal programming or "best fit" models can be solved by using linear programming (LP). There are LP software packages such as LINDO now available for use on microcomputers that are capable of solving best fit models large enough to be useful to management.

Flex Model

Methods other than firing could be used to deal with excess personnel. Detailing to other jobs, cross-assignment, and work rescheduling have all been used to deal with this situation. For most occupations, higher level positions are filled by internal promotion. These internal promotions create vacancies at lower levels that are usually filled by external hires. The lower level vacancies could alternatively be filled by excess employees in other occupations. A special version of the optimization model, called the "flex model" was developed to explicitly

recognize these management flexibilities and allow changes to projected transfer and promotion rates for all the job categories under study. This flex model has been implemented on a microcomputer using specialized optimization software.

Best Fit Flex Model

The force fit model has been useful for quick results that provide approximate management information to guide the overall business outcomes. However, the force fit model doesn't have enough flexibility to deal with wide swings in workload over the planning period that are best met by changing traditional workforce flows. On the other hand, the flex model has been found to allow too much flexibility to target specific staffing areas where more management attention should be placed. The microcomputer version of the flex model also can't represent additional constraints as well as the best fit model.

To accommodate these concerns, a "best fit flex" model model has been developed. This model adds selective promotion flexibility to the best fit model. The model thus allows two levels of flexibility: flexibility in meeting staffing goals and flexibility in projecting internal promotion flows. The overall idea of the best fit flex model can then be stated as:

Minimize deviations from manpower and promotion goals

Subject to:

- Personnel on-board
- Projected workforce flows
- Workforce ceiling constraints
- Salary budget constraints
- Hiring constraints

The best fit flex model can also be solved with microcomputer LP packages such as LINDO.

CASE STUDY RESULTS

This section provides case study results comparing several policies using the best fit flex model. This example is only illustrative since the actual organizational situation has changed drastically since the study was done. While a variety of alternatives are continually being evaluated, for purposes of this paper, only one set of overall workforce planning numbers (Table A1) are used to allow direct comparison of policy results. The policies chosen also illustrate the type of results that the force fit model would produce. As can be seen in Table A1, the projected size of the workforce drops sharply, rises slightly, dips again, and then rises sharply.

Table A1

Total Projected Workforce Strength

YEAR	TOTAL GOAL
88	10,108 (Actual)
89	9,696
90	8,607
91	7,096
92	7,401
93	7,096
94	7,701
95	8,501
96	9,104

Occupation and skill level categories similar to those used in previous modeling exercises were used. The occupation and skill level categories used are provided in Figure A2. These categories emphasize the blue collar rather than white collar occupations. Individual goals for each category were obtained from the total goals by using the same proportions as in the initial on-board population. The model support system allows the user to modify these individual goals or specify entirely new goals. These different distributions of individual goals would typically be used in later stages of analysis. For purposes of this comparison study, constant proportions were used across the years.

All model results were developed using a goal programming model structure. These include model results similar to those which could have been developed with the force fit model using the simpler LOTUS 1-2-3 spreadsheet methodologies. The policy differences were represented by changing values of the priority weight structure integral to goal programming. The types of relative priorities used in the best fit flex models are: (1) promotion flexibility: above or below historical rates; (2) hiring; (3) staffing flexibility: above or below requirements for job category; and (4) firing.

The force fit policy was represented by using high relative penalty weights for staffing flexibility, to minimize use use of this flexibility. The no fires policy was represented by using highest penalties for firing. The best fit policy was represented by use of a balanced set of penalties for promotion flexibility, hiring, staffing flexibility, and firing, in ascending order. A variety of best fit solutions could be obtained by varying the order and value of these penalties. The user specifies the penalty weights along with other inputs through a LOTUS 1-2-3 spreadsheet. A further discussion of how relative penalty weights are used can be found in Niehaus (1979).

OCCUPATIONS

1	GS/GM AND SIMILAR	9	PIPEFITTER
2	ELECTRONICS MECHANIC	10	SHIPWRIGHT
3	ELECTRICIAN	11	PAINTER
4	MACHINIST	12	MARINE MACHINIST MECHANIC
5	WELDER	13	ORDNANCE EQUIPMENT MECHANIC
6	SHEET METAL MECHANIC	14	RIGGER
7	BOILERMAKER	15	OTHER BLUE COLLAR

SKILL LEVELS

LEVEL 1: GS 1-4 OR APPRENTICE
LEVEL 2: GS 5-8 OR HELPER
LEVEL 3: GS 9-12 OR LIMITED MECHANIC
LEVEL 4: GS/GM 13-15 OR JOURNEYMAN/LEADER
LEVEL 5: EXECUTIVE OR SUPERVISOR

Figure A2: Occupation/Skill Level Groups for Shipyard Projections.

A portion of the detailed output from the model is provided in Figure A3. This example shows results for two selected occupations, electricians and marine machinery mechanics, as well as organizational totals, for two planning periods, FY90-91 and FY91-92. From left to right, the example shows initial planning period staffing, recommended hires and fires for the period, recommended flexibilities in promotion to the next job level, specified staffing goals for the end of the period, recommended deviations from these goals, and the resulting staffing at the end of the period. The end period staffing is then the initial staffing for the next planning period.

The example shows some firing in levels 4 and 5 during the first period as the model tries to move from an initial population of 8605 to a goal of 7096. Promotions from levels 2 and 3 are also reduced to avoid build-up of people in higher job levels. Even with these actions, recommended staffing exceeds the goals for the end of the period, especially for job level 3. The immediate reason is that the model is also trying to meet a higher overall goal of 7407 at the end of the next planning period without excessive hiring. Thus, it retains people needed for the next period in job levels 3, 4 and 5. Moderate hiring is suggested at lower job levels in the second planning period. Promotion flexibility is still used to prevent build-up at higher job levels. The probable reason for continued reductions in promotions is that the higher job levels have lower attrition rates and that overall size is being reduced. The recommended staffing at the end of the second planning period is very close to the goals.

BEST FIT FLEX MODEL SAMPLE OUTPUT

		SEP 90 ONBOARDS	FY91 HIRES/ FIRES	FLEX	SEP 91 GOALS	DEV	SEP 91 ONBOARDS	FY92 HIRES/ FIRES	FLEX	SEP 92 GOALS	DEV	SEP 92 ONBOARDS
TOTALS		8605	95	0	7096	607	7703	285	2	7401	6	7407
			-343	-112		0		0	-210		0	
OCCUPATION	LEVEL											
ELECTRICIAN	1	33	3	0	27	0	27	9	0	29	0	29
ELECTRICIAN	2	31	0	-2	25	0	25	7	0	26	0	26
ELECTRICIAN	3	56	0	-8	46	5	51	0	-7	48	0	48
ELECTRICIAN	4	401	-12	0	331	36	367	0	0	345	0	345
ELECTRICIAN	5	84	-11	0	69	3	72	0	0	72	0	72
MARINE MACH MECH	1	49	0	0	41	0	41	7	0	42	0	42
MARINE MACH MECH	2	21	1	-2	18	0	18	4	-1	18	0	18
MARINE MACH MECH	3	72	0	-9	60	7	67	0	-8	62	0	62
MARINE MACH MECH	4	571	-46	0	470	36	506	0	-2	491	0	491
MARINE MACH MECH	5	169	-37	0	140	0	140	0	0	146	0	146

Figure A3: Example of Shipyard Occupation Projections
(Best Fit Flex Model)

A comparison of the results from the model using three different policies is shown in Figure A4. This is a line graph comparison with the total strength goals shown as the solid line. The Force Fit policy results are the same as the total strength goals since the model solution forces the results to meet the goals exactly.

For the No Fires policy, considerable deviation from the goals results since natural attrition can't produce enough losses to meet such a large change in the required workforce profile. The Best Fit policy allows a combination of some fires, some goal deviations and promotion flexibility to keep people who will be needed later, as can be seen in Figure A3. The Best Fit line falls between those for Force Fit and No Fires.

Figure A5 is a bar graph comparison of the model results for the different policies showing the sums of the projected differences from the individual staffing goals. Figure A6 shows the comparisons in terms of projected workforce hires and fires. Of particular interest in Figures A5 and A6 is the fact that both overages and shortages are shown for some of the years. These results reflect the fact that one may need to continue to hire in some job categories even though the overall trend may be sharply downward. The comparison of Figures A5 and A6 also shows the tradeoffs between meeting goals closely and reducing workforce turbulence. The best fit policy shows a compromise between the extremes of the force fit policy and the no fires policy.

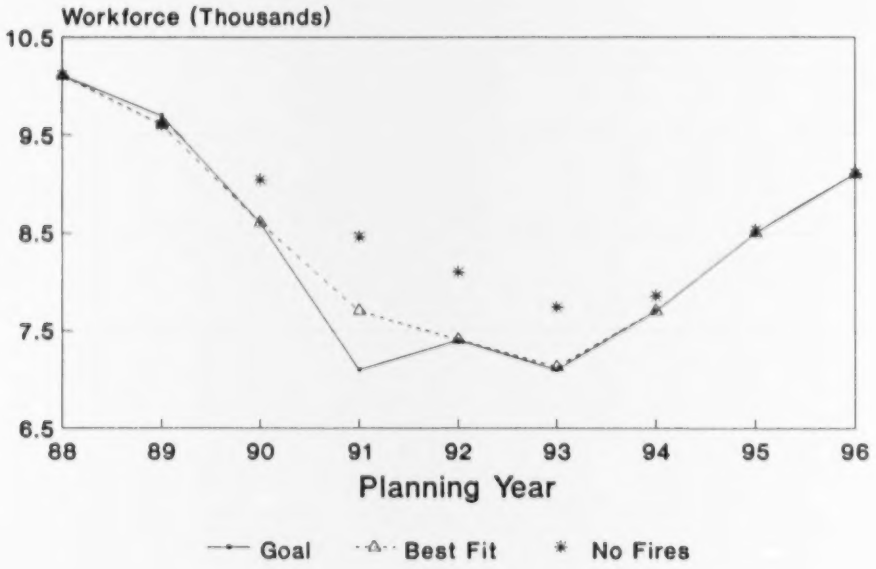

Figure A4: Goals and Projected Workforce

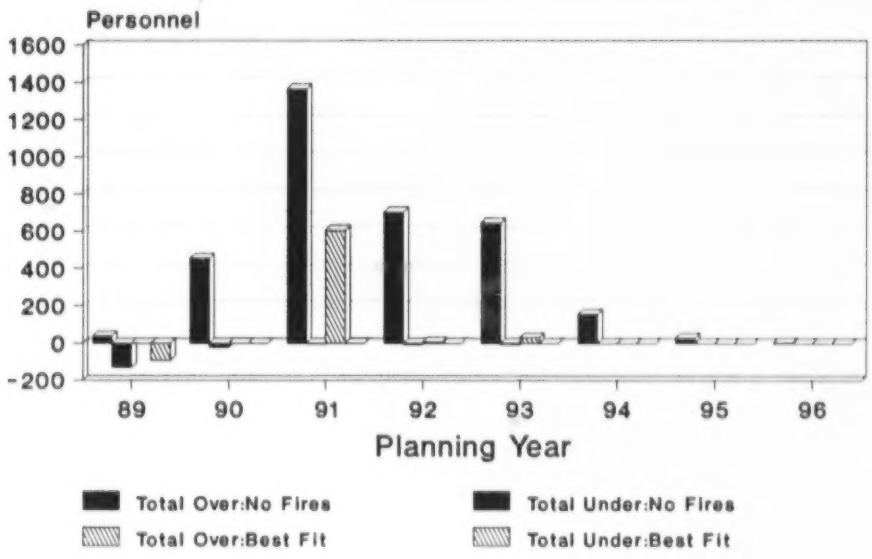

Figure A5: Projected Differences from Goals

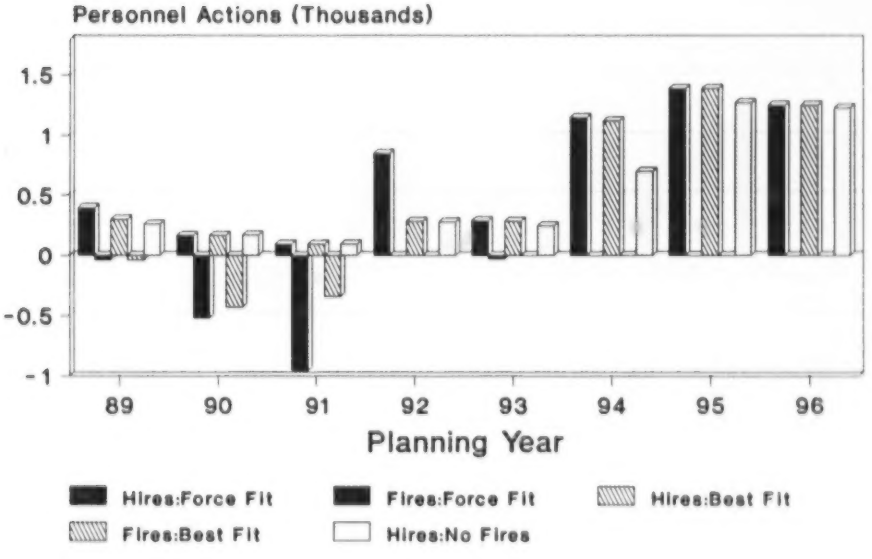

Figure A6: Projected Hires/Fires

Each of the three examples reflects a situation that may be managerially relevant. The force fit case would occur if headquarters directed that workforce controls must be precisely met. The no fires case would apply if the shipyard was directed to achieve reductions through normal attrition with no RIFs permitted. The best fit case is an example of a response that attempts to satisfy all the various constraints as closely as possible. In the latter cases, additional management actions may be required to phase the workload or workforce to smooth the changes over time.

The shipyard is a project-oriented organization where there is a definite workload cycle associated with any large incoming ship overhaul or new construction. Different types and numbers of workers are needed as the workload moves through the shipyard. Initially, much of the work is associated with planning and preparation to do the actual job. In the case of an overhaul, emphasis then shifts to evaluating what needs to be repaired, disassembling components, and ordering needed parts and materials. This is followed by the actual repair work, and finally, reassembling and testing to ensure that the work was properly done. The staffing needs to be phased to fit with this changing workload. The planning models should reflect the aggregate of all these decisions to provide a means to control the net changes to the workforce.

A particular concern in the Mare Island situation described in this case study is the maintenance of a skilled workforce. The shipyard has an apprentice program to provide a continuing stream of skilled workers. The intake can vary from 100 to 400 new apprentices annually. Improvements to the models are now in development to determine the required size of the incoming classes to best meet the projected demand at later points in the planning scenario. The main problem in this development is trying to keep the size of the models small enough to operate on a microcomputer.

IMPLEMENTATION ISSUES

The implementation of the MCAMAS workforce planning models at Mare Island was accomplished on an evolutionary basis. The initial efforts were exploratory, with emphasis on establishing basic modeling capabilities using the spreadsheet or force fit models. The inputs were developed and outputs displayed using a LOTUS 1-2-3 shell for ease of use by shipyard personnel. As this work continued, the flex model was adapted on a microcomputer with a LOTUS 1-2-3 shell to fit shipyard needs. At later stages, the best fit and best fit flex models were adapted for shipyard use on a microcomputer with the LINDO LP software. LOTUS 1-2-3 is still used to enter data and display results, providing a familiar user interface. Figure A7 illustrates the components of the model support system and its operation.

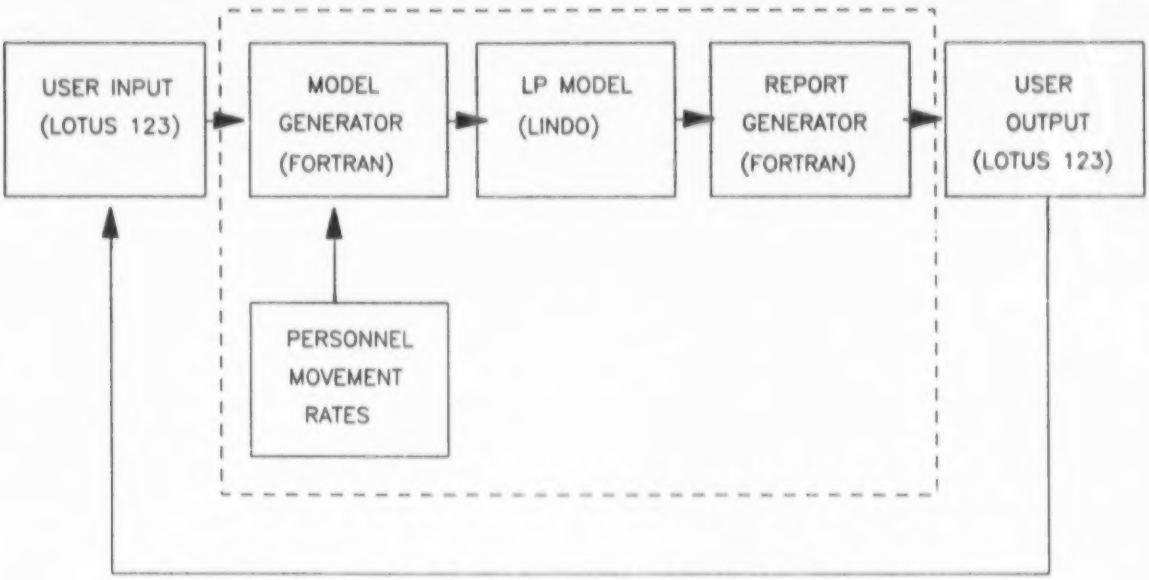

Figure A7: Optimization Model Operation

At Mare Island, a staff person was trained to operate the models and act as the bridge between management and model technical operation. All necessary hardware and software has been installed or ordered. The microcomputer version of CAMAS for use by organizations with up to 12,000 employees is now operational. These MCAMAS modeling capabilities will become available to the larger (2,000 or more employees) Navy shore installations as another application of NCPDS.